ZEUS Superior

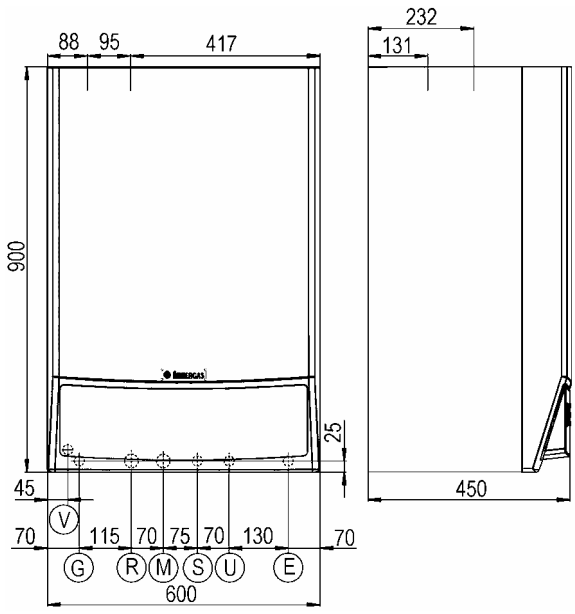
Wall-mounted, room sealed fan assisted boiler with storage tank and Gaudium Magnum device

ZEUS 21 Superior
ZEUS 24 Superior
ZEUS 27 Superior

- GENERAL FEATURES

ZEUS Superior is a wall-hung room sealed fan-assisted boiler featuring a "Gaudium Magnum" device for fully exploiting the characteristics of this 54 l boiler in AISI 316L stainless steel.
The appliance is regulated and controlled by means of a printed microprocessor control board which, through a display, shows the state of boiler operation *(temperature, safety devices, etc.)* and enables it to be connected *(optional)* to the Remote Friend Control, to the zones unit and to the Multisystem Water Disconnector.*(D.I.M.)*
The range includes three electronic-ignition versions with heat outputs of 24.4 kW (21,000 kcal/h), 27.9 kW (24,000 kcal/h) and 31.4 kW (27,000 kcal/h).
The hydraulic circuit features a high-head copper water-gas exchanger, an electric 3-way valve, a 2 l d.h.w. expansion vessel, an adjustable system by-pass and a device that permits to increase the maximum available flow of the domestic hot water ***(Gaudium Magnum).***
Combustion air flow into the sealed chamber and flue extraction are ensured by a fan, the correct operation of which is controlled by a differential pressure switch.

- MAIN DIMENSIONS AND CONNECTIONS



DIMENSIONS (mm)

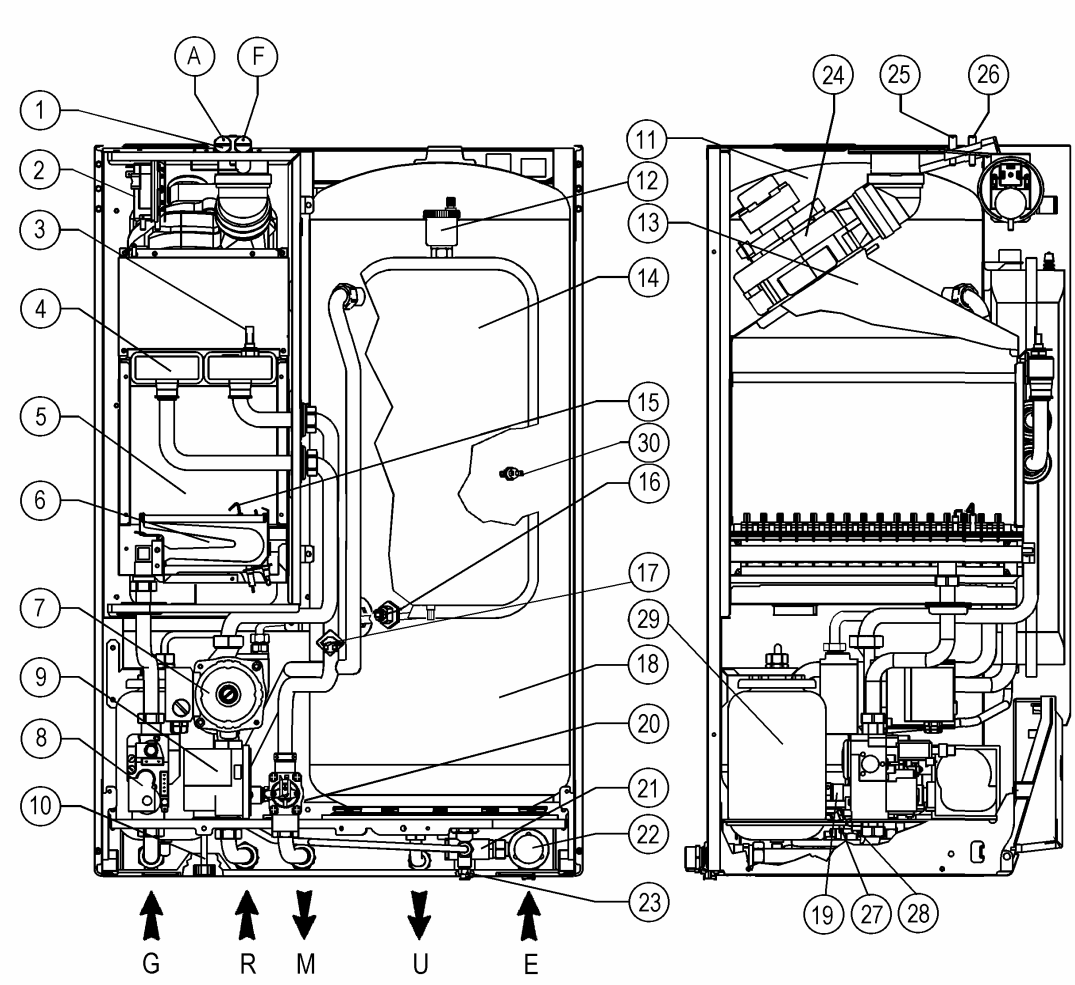
	HEIGHT	WIDTH	DEPTH
ZEUS 21/24/27	900	600	450

ATTACCHI

	GAS	SYSTEM		DOMESTIC WATER	
	G	R	M	U	E
ZEUS 21/24/27	1/2 “	3/4 “	3/4 “	1/2 “	1/2 “

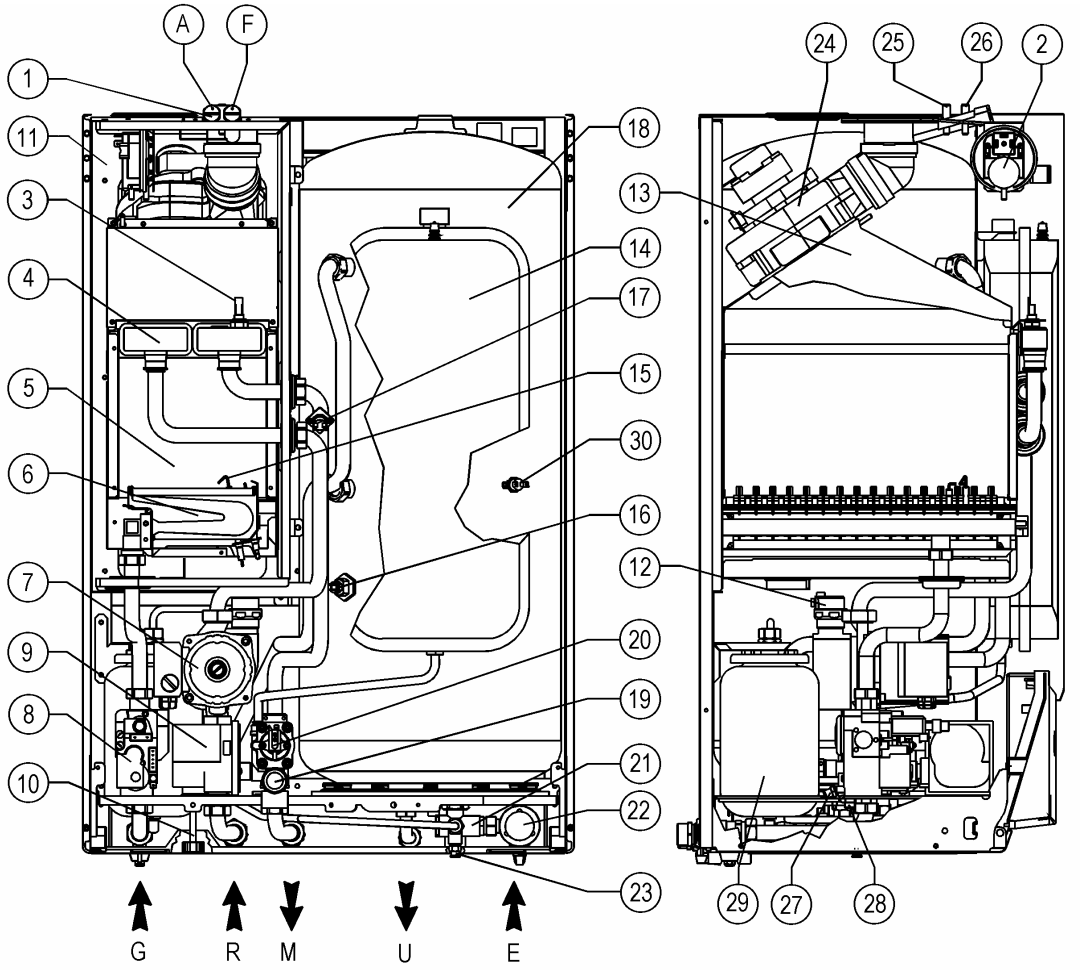
V - electric connection
G - gas supply
R - system return
M - system delivery
S - recirculation *(optional)*
U - domestic hot water outlet
E - domestic cold water inlet

ZEUS 21-24 Superior MAIN COMPONENTS



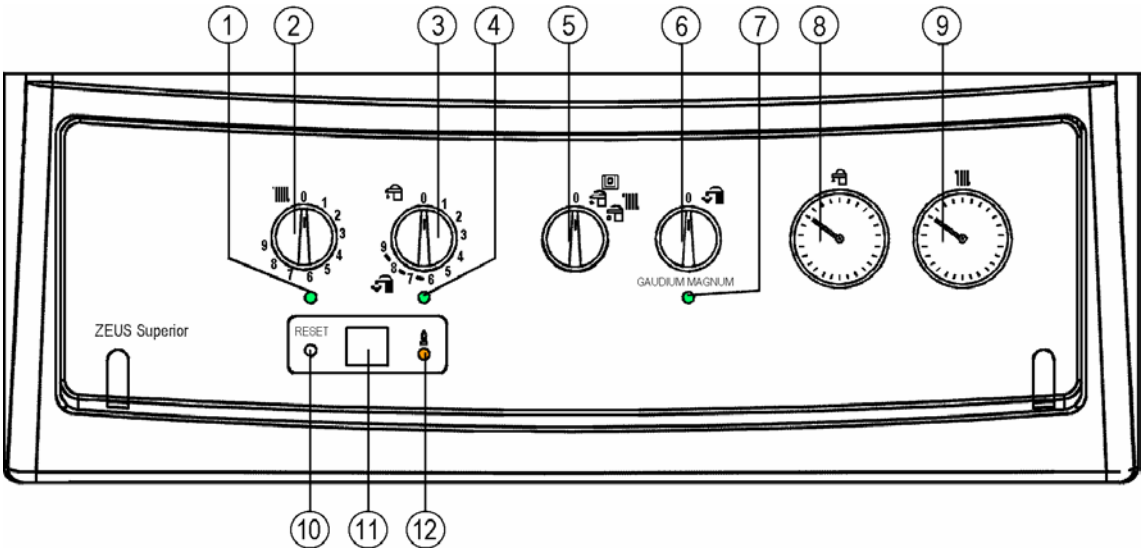
1 - Intake points *(A=air) (F=flue)*
2 - Flue safety pressure switch
3 - Adjustment and limit NTC probe
4 - Primary heat exchanger
5 - Combustion chamber
6 - Burner
7 - Pump
8 - Gas valve
9 - Motorized 3-way valve
10 - System filling valve
11- Sealed room
12- Automatic air vent
13- Flue hood
14- Expansion vessel
15- Ignition and detection electrodes
16- Domestic hot water NTC probe
17- Overheating safety thermostat
18- 316L stainless steel storage tank
19- 3 bar safety valve *(system)*
20- Pump pressure switch
21- 8 bar safety valve *(domestic hot water)*
22- Gaudium Magnum device
23- Storage tank drain valve
24- Fan
25- Positive signal pressure point
26- Negative signal pressure point
27- System drain valve
28- Adjustable system by-pass
29- Domestic hot water expansion vessel
30- Max d.h.w. flow limit thermostat

ZEUS 27 Superior MAIN COMPONENTS



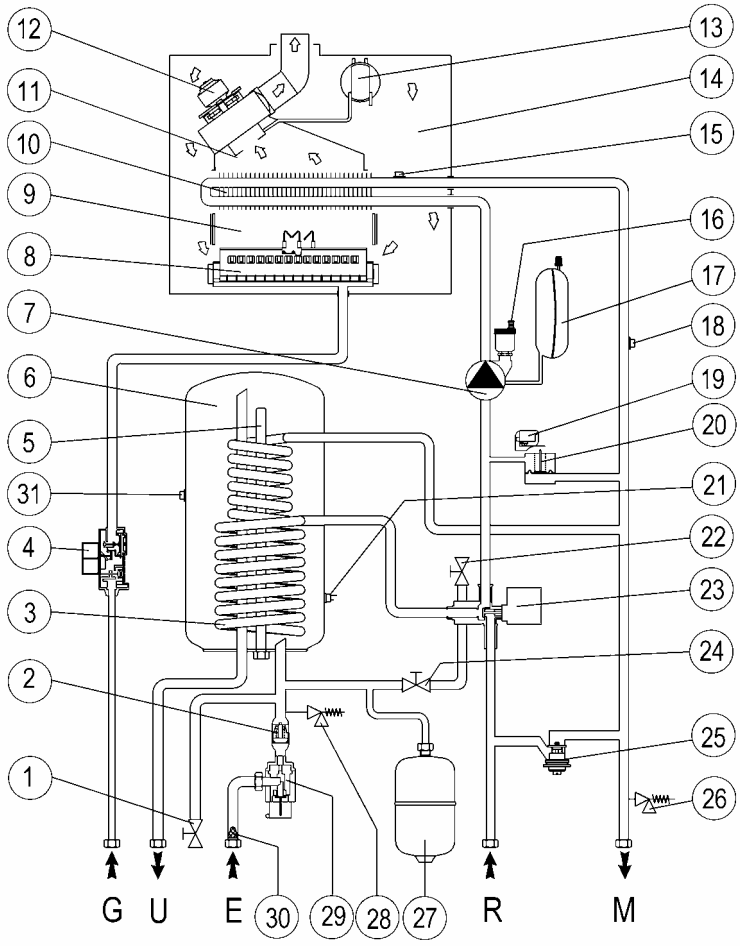
1 - Intake points *(A=air) (F=flue)*
2 - Flue safety pressure switch
3 - Adjustment and limit NTC probe
4 - Primary heat exchanger
5 - Combustion chamber
6 - Burner
7 - Pump
8 - Gas valve
9 - Motorised 3-way valve
10- System filling valve
11- Sealed room
12- Automatic air vent
13- Flue hood
14- Expansion vessel
15- Ignition and detection electrodes
16- Domestic hot water. NTC probe
17- Overheating safety thermostat
18- 316L stainless steel storage tank
19- 3 bar safety valve *(system)*
20- Pump pressure switch
21- 8 bar safety valve *(d.h.w.)*
22- Gaudium Magnum device
23- Storage tank drain valve
24- Fan
25- Positive signal pressure point
26- Negative signal pressure pointr
27- System drain valve
28- Adjustable system by-pass
29- Domestic hot water expansion vessel
30- Max d.h.w flow limit thermostat

CONTROL PANEL



1 - Green heating operating indicator
2 - Heating temperature selector
3 - Domestic hot water temperature selector
4 - Green domestic hot water operation indicator
5 - 0/SUMMER and CAR/WINTER switch
6 - Gaudium Magnum operation switch
7 - Green Gaudium Magnum operating indicator
8 - Storage tank thermometer
9 - Boiler pressure gauge
10- Reset
11- Temperatures and diagnostics display
12- Yellow burner operation indicator

HYDRAULIC CIRCUIT



1 - Storage tank drain valve
2 - One way valve
3 - Coil
4 - Gas valve
5 - Magnesium anode
6 - Storage tank
7 - Pump
8 - Burner
9 - Combustion chamber
10- Primary heat exchanger
11- Flue hood
12- Fan
13- Flue safety pressure switch
14- Sealed room
15- Adjustment and limit NTC probe
16- Automatic air vent
17- Expansion vessel
18- Overheating safety thermostat
19- Pump pressure switch
20- Pump pressure meter
21- Domestic hot water. NTC probe
22- System drain valve.
23- Motorised 3-way valve
24- System filling valve
25- Adjustable system by-pass
26- 3 bar safety valve
27- D.h.w. expansion vessel
28- 8 bar d.h.w. safety valve
29- Gaudium Magnum device
30- Cold water inlet filter
31- Max flow limit thermostat

G – Gas supply
U – Domestic hot water outlet
E – Domestic cold water inlet
R – System return
M – System delivery

The hot water for the heating system and for the domestic circuit is produced by a primary circuit and a secondary (*domestic*) circuit that are activated according to demand.

PRIMARY CIRCUIT *(BOILER CIRCUIT)*

The primary circuit with the relative control and safety devices is activated **with each heating or domestic circuit demand for water**.

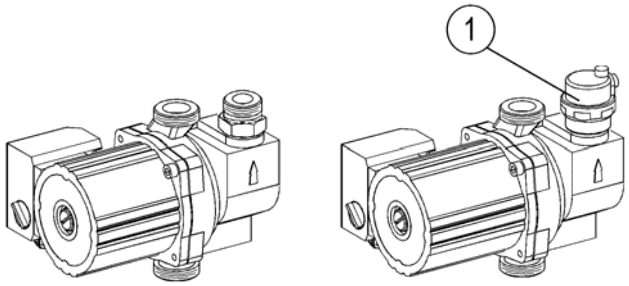
- OPERATION

The copper blades of the water-gas exchanger (10) absorb the heat contained in the flue gas produced by combustion.
Those blades then transfer the heat to the water being circulated inside by the boiler pump (7).
The water is introduced directly into the plant or can be deviated inside the cylinder coil (3).
This depends on the position of the electric 3-way valve (23) which, depending on the demand, allows water to flow through the plant delivery (M) and return (R) pipes or deviates it to the coil (3).

- CIRCULATOR

This operates on the primary circuit return and is located on the brass header assembly of the electric three ways valve.
It is connected to the monobloc and exchanger by means of threaded connecting pipes.
The pumps used differ according to boiler output *(see head - flow graph)*.
The body is equipped with a threaded fitting which on the21 and 24 versions is used for the connection of the expansion vessel and of the automatic vent valve, while on the 27 version is used for the directly connection of the automatic air vent.

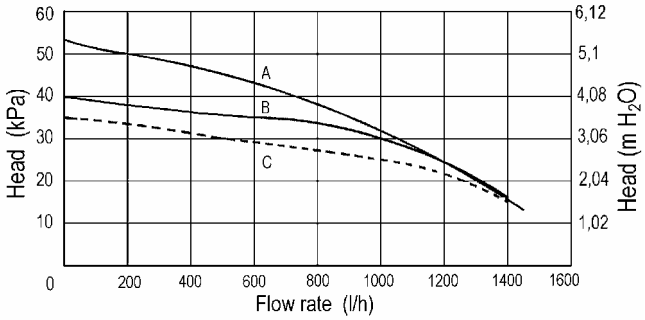
21 and 24 versions *27 version*



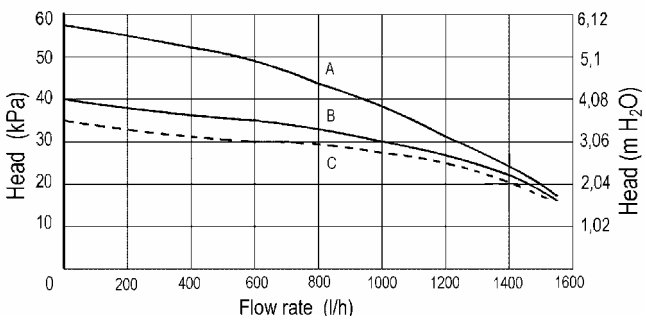
- FLOW HEAD GRAPH

The curve that represents the relation between the flow rate and the available head depends on system bypass adjustment which, depending on its position, gives the system greater or less head.
The graphs are refereed to the pump operating at top speed with:
- **A** = Bypass disconnected *(screw fully tightened)*
- **B** = Standard bypass adjustment *(screw tightened by 4.5 turns with respect to fully-tightened position)*
- **C** = Bypass open *(screw fully loose)*

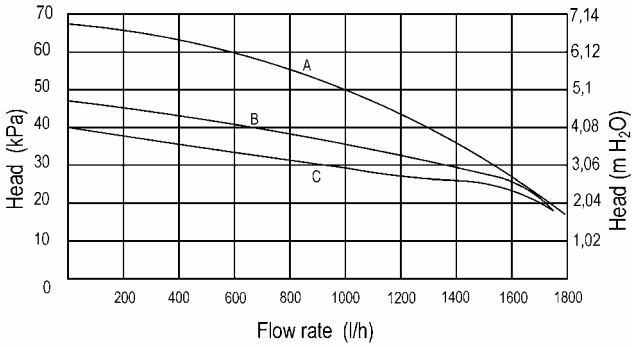
ZEUS 21 Superior



ZEUS 24 Superior

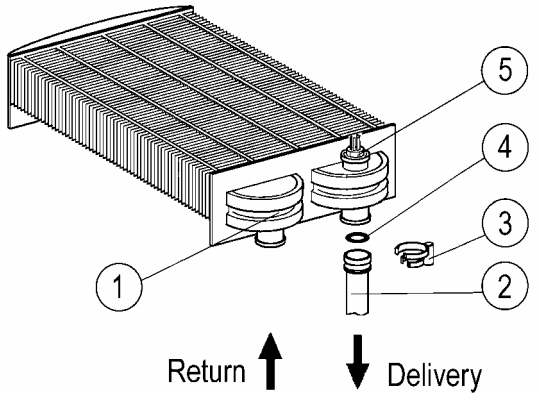


ZEUS 27 Superior



- PRIMARY HEAT EXCHANGER

This is a water-gas blade type exchanger with copper pipes and fins at the outlet of which an NTC heating probe (5) is located.
The size differs according to boiler heat output.
The four pipes passing through the exchanger are connected in parallel (1) two by two, to reduce flow resistance to the utmost and provide a greater available head.
It is connected to the pump flow and to the primary circuit flow by means of coupling pipes (2) with O.R. seal (4).
These are secured by means of special forks (3).



- SAFETY DEVICES AND CONTROLS

System by-pass (6)

This ensures water circulation in the primary circuit (*between flow and return*) even when this is prevented by the high resistance of the system.
It is mounted on the delivery manifold and can be adjusted by means of a screw accessible from the bottom part of the valve plate.

System filling valve *(5)*

This valve is installed between the boiler circuit and the domestic circuit cold water inlet is used to pressurize the heating system.
Downstream of the cock, an one way valve is fitted *(nr 2 of hydraulic circuit)* that prevents accidental flow of water from the primary circuit to the water network *(d.h.w. circuit)*.
Its seat is located in the lower part of the monobloc where it is screwed on.

Pump pressure meter *(2)*

This detects the difference in pressure at pump extremities.
Its housing is in the delivery manifold and is coupled to a micro-switch (3) that prevents burner operation in the event of pump blockage or no water in the boiler circuit.
Prevents primary exchanger overheating.

3-bar safety valve *(4)*

Prevents safety pressure (3 bar) being exceeded in the circuit**.**
On the versions 21 and 24 is fitted to the rear part of the delivery manifold group, while on the version 27 is fastened in its front part by means of a socket head screw.
When this trips, water exits from the flow pipe.

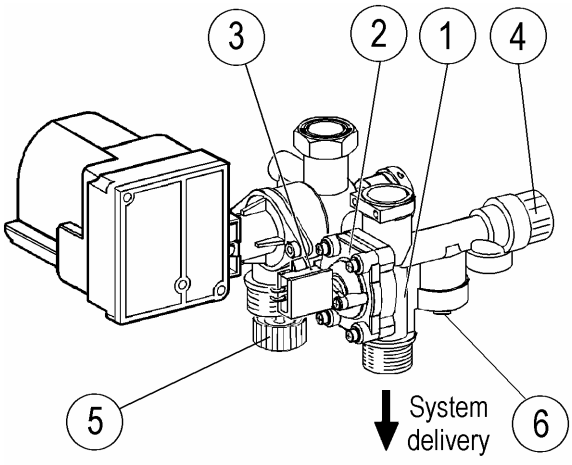
Automatic air vent *(7)*

Automatically expels any gaseous substances in the boiler circuit.
On the versions 21 and 24 , the valve is screwed on the water side of the expansion vessel.
On the version 27 is mounted on the pump body.

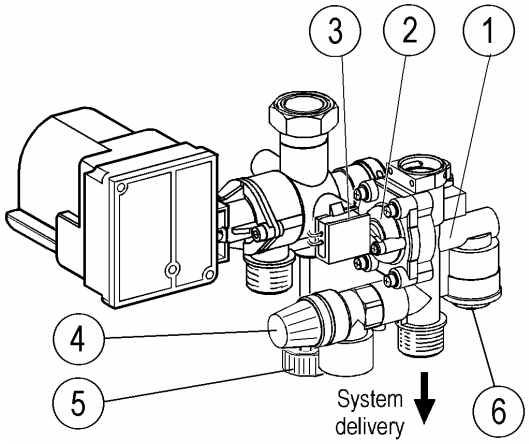
Expansion vessel (*8)*

Compensates changes in volume following heating of water and permits reducing pressure changes.
It has a pre-load pressure of 0.8 bar and a capacity of 8 l on the versions 21-24 and 10 l on the version 27.
It is located in front of the storage tank .

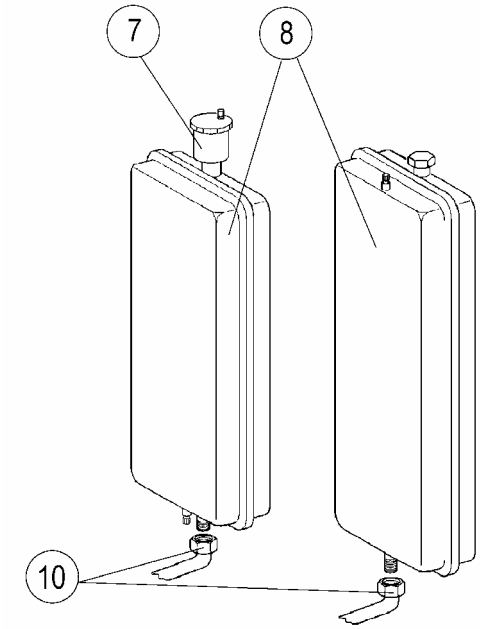
21 and 24 versions



27 version

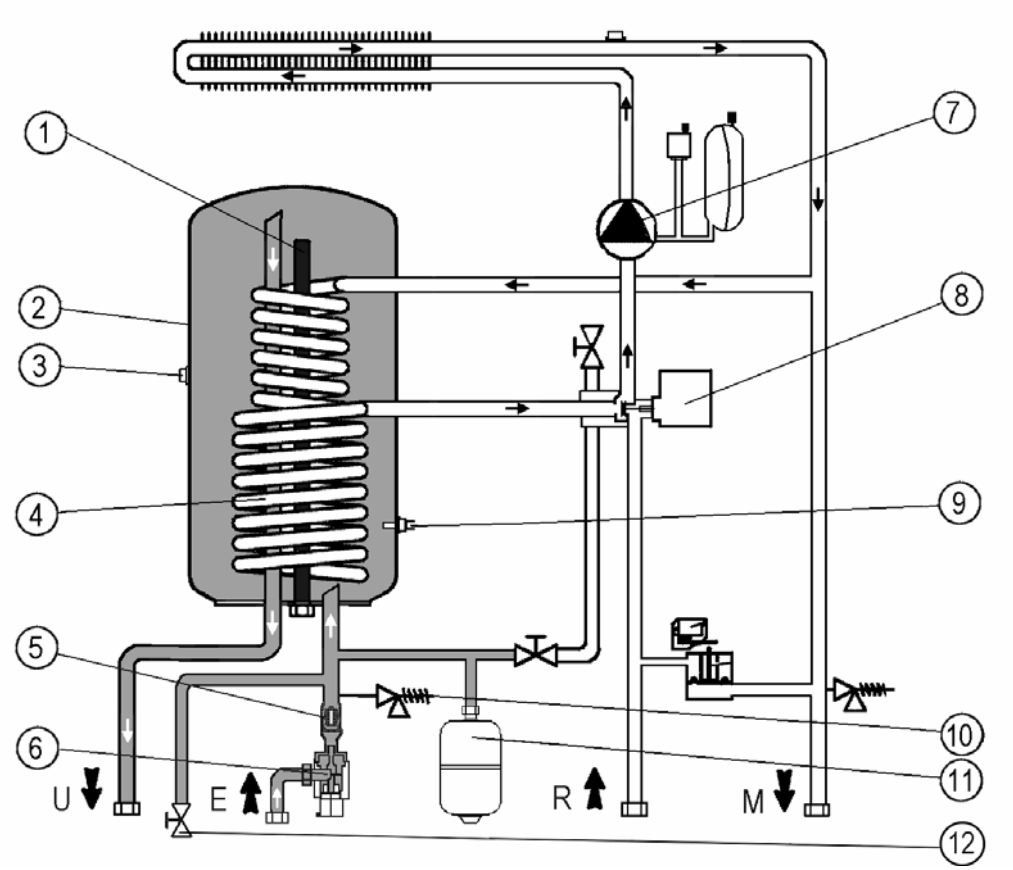


21-24versions ***27 version***



HYDRAULIC CIRCUIT

SECONDARY CIRCUIT (D.H.W. CIRCUIT)



The domestic hot water circuit is engaged every time the water contained in the storage tank and measured by means of the d.h.w. NTC sensor (4) has to be restored to the desired temperature. This occurs when domestic hot water is used and to restore the losses due to thermal dispersion.

- OPERATION

Following a d.h.w. request, the modulation board starts the boiler pump (7) and powers the motor of the electric 3-way valve (8).
The consequent movement of the valve to domestic hot water position *(see 3-way electric valve operation),* closes the system return pipe (R) and, at the same time, opens the return pipe of the storage tank coil (4).
This way, circulation is allowed in the coil (4) which, through its walls, enables the cold domestic water to absorb the heat contained in the primary circuit water.
In this phase, the central heating function is disconnected as the production of d.h.w. has priority.

- STORAGE TANK

This AISI 316L STAINLESS STEEL storage tank has a useful capacity of 60 l.
It consists of an external sleeve enclosed at the bottom by a flange fixed by 12 screws.
A STAINLESS STEEL cylindrical pipe with a concentric spiral shape (*coil*) is inserted inside and is coiled along all the height of the storage tank.
Heat is exchanged between the hot water in the primary circuit and the water contained in the cylinder through the walls of the coil.
This keeps the water in the cylinder at a constant temperature and guarantees instant availability of domestic hot water on demand *(21.000, 24.000 e 27.000 kcal/h according to the versions)*.
If necessary, the coil can be removed from the storage tank after taking off the lower inspection flange.
The following devices ensure that it operates correctly and is maintained in good condition:

Anode (1)
It is inserted in the storage tank and protects it against the action of galvanic currents.
It is screwed onto the external sleeve at the bottom of the storage tank.

Polyphosphate metering unit *(optional)*
This prevents any limestone deposits from accumulating on the walls of the coil.
The special kit is mounted on the domestic cold water circuit inlet.

Gaudium Magnum (6)
(see description and operation Gaudium Magnum)

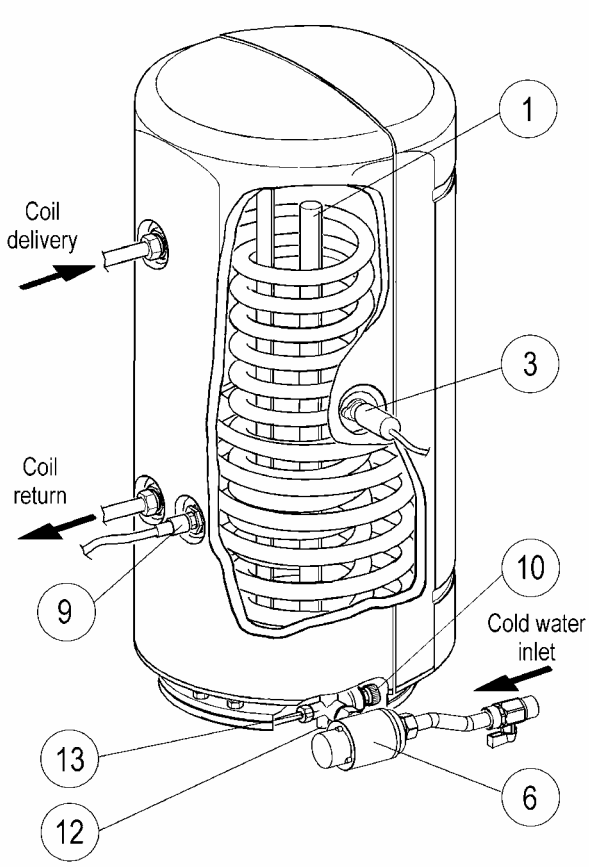
Recirculation kit *(optional)*
This is used to connect the pipes of any recirculation system of the domestic hot water circuit.
It consists of a pipe that is inserted into the tank after having removed the anode with relative plug.
When the kit is installed, the anode must be screwed to the end of the pipe.

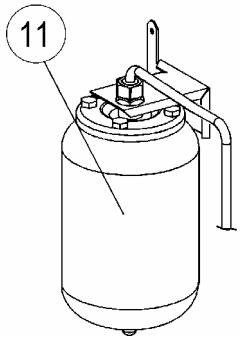
Domestic hot water NTC sensor (NB) (9)
This allows the printed control board to detect the temperature of the water contained in the storage tank.
It is attached to the external wall of the storage and inserted inside an immersion trap.

Maximum flow d.h.w limit temperature thermostat (3)
It is a clicson thermostat which supplies the solenoid valve of the Gaudium Magnum device.
It is fitted on the external wall of the storage tank.

Safety valve unit (13)
This unit is located in the lower part of the cylinder near the domestic circuit cold water inlet.
In addition to an 8-bar valve (10) that prevents the safety pressure from being exceeded inside the storage, it also includes:
- a filter, a cylinder drain valve with hose fitting (12) and a one-way valve *("5" domestic circuit)* to prevent a pressure increase following heating of the domestic circuit hot water from causing water to return toward the water mains.

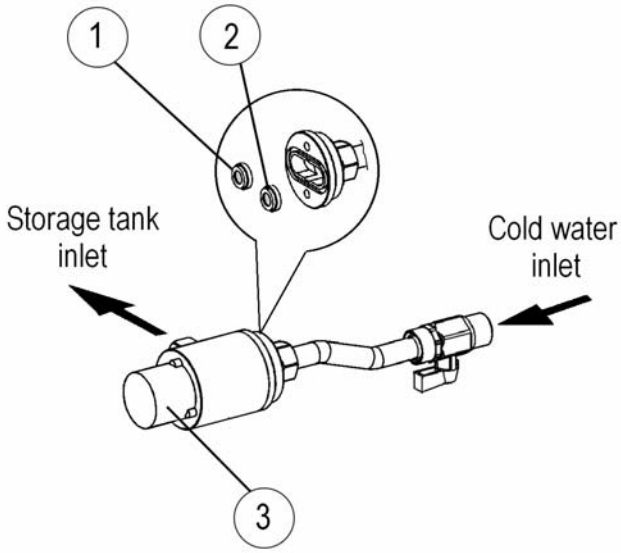
Domestic hot water circuit expansion vessel (11)
It compensates for volume variations following heating of the water contained in the cylinder.
It is connected to the safety valve unit and has a capacity of 2 l at a pre-load pressure of 3.5 bar.





- GAUDIUM MAGNUM (6)

This device is fitted between the cold water inlet *(inlet)* and the safety valve group *(outlet)*.
Inside it works an electrovalve that in stand-by condition allows the water passage through a flow limiter (1) *(10 l/min for versions 21 and 27, 12 l/min for version 24)*
When the electrovalve (3) is supplied the water flows trough a supplementary passage through a 6 l/min flow limiter (2)

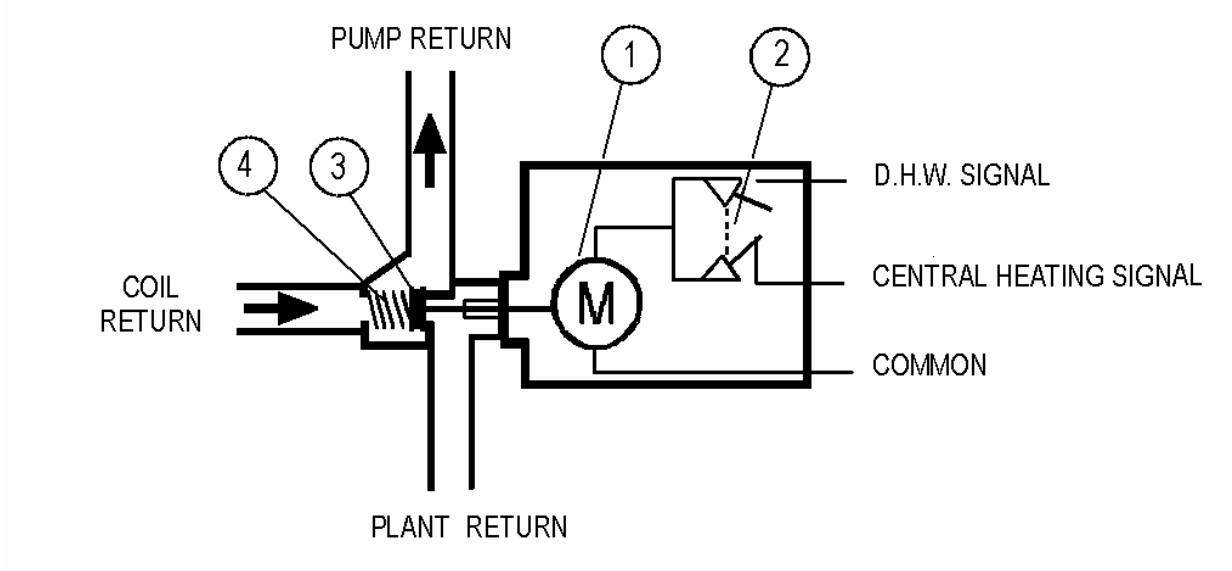


- Operation

The valve is electrically enabled *(230 VAC)* setting the switch "Gaudium Magnum", located on the control panel, on position .
It starts to work when the limit thermostat of max flow (3), fitted on the storage tank, detects a temperature upper 50 °C.
When the temperature gets down under 41 °C, the limit thermostat of max flow (3) automatically deactivates the valve (3).
When the storage tank temperature is high, this system permits to have an high domestic hot water flow rate.
Instead when the temperature gets down, the hot water flow rate is limited in order to restore rapidly the hot water temperature.
Re-setting Gaudium Magnum switch on "0" position, the valve (3) is always deactivates.

N.B.: in order to activate the "Gaudium Magnum" operation, the adjustment knob of domestic hot water temperature must be adjusted from 6 to 9.

- MOTORIZED 3-WAY VALVE



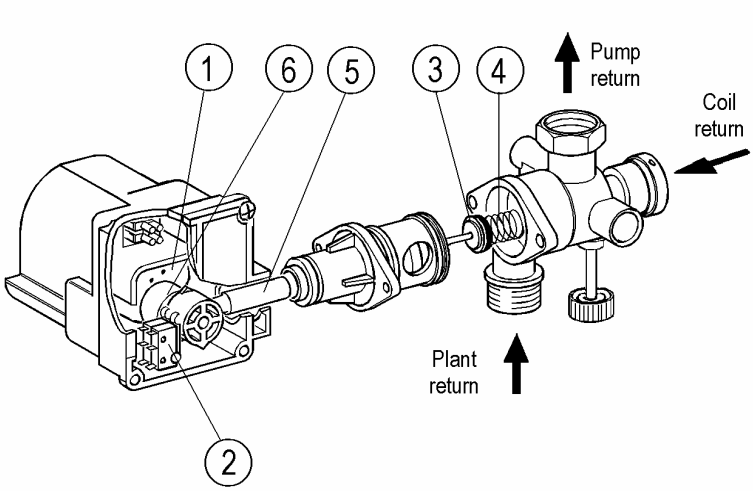
This is a 3-way electric valve operating on the return pipe of the primary circuit that permits, according to the type of request *(domestic hot water or central heating*), running boiler water into the central heating system or into the storage tank coil
This depends on the position of the shutter (3) which impedes transit towards the system and at the same time permits this towards the storage tank *(d.h.w. position)* or vice versa *(central- heating position).*
Movement of the shutter (3) in both positions is achieved by energizing the motor (1).

Operation

To move to the heating or domestic hot water circuit, the motor (1) is activated by the control card.

Activating the motor, whose rpm is reduced by a special gear system, begins rotating a disc (6) with an eccentric connection on the shaft of that motor.

The moving disc activates a special coupling (5) that, with each 180° rotation, compresses (*heating position*) or releases (*domestic circuit position*) the plug valve contrast spring (4).



Hydraulically reaching the requested position causes first one limit switch (2) to open and then another to close.
This allows the voltage to be cut off to the motor, freezing it in the position reached and enabling motor operation only when a different request (*domestic circuit or heating signal)* is received.

GAS CIRCUIT

The circuit consists of an atmospheric burner and a modulating type valve for gas combustion and gas flow adjustment respectively.

- OPERATION

When the main coils (3) are energized, both inner valve shutters open, allowing the gas to flow towards the burner.
The flow rate/outlet pressure is regulated by means of the gas valve stabilizer and the modulation coil.
By means of the burner nozzles (7), the fuel is injected into the venturi pipes *(ramps)* inside which the air-gas mix is obtained that is ignited by the spark from the ignition electrodes (5).

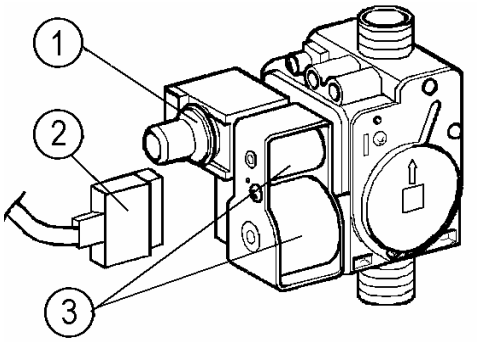
- MODULATING GAS VALVE

The gas valve *(SIT 845)* features two main coils and a third modulation coil controlled by the adjustment board.
The maximum and minimum outlet pressure settings can be made on this valve *(see gas adjustments)*.

Main electric coils (3)
These two ON-OFF coils are fed (230 Vac) by the control card to ignite the burner.
They are electrically connected in parallel and fed by mains voltage through a special connector (2).

Modulation coil (1)
This low-voltage coil is controlled by the modulation card.
It controls the gas valve stabilizer and can be used to vary the outlet pressure so that it is proportional to the d.c. signal conveyed through it.

SIT 845

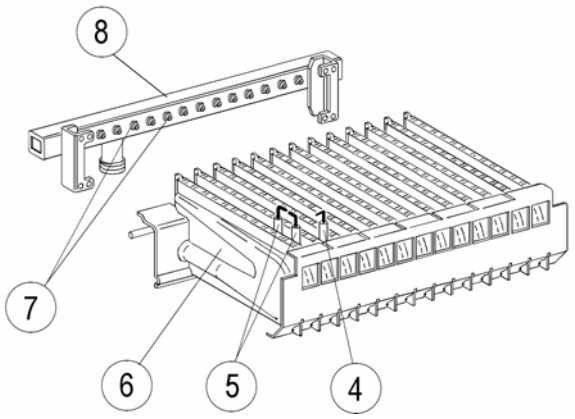


- BURNER

The burner consists of horizontal venturi pipes (6) in which the gas is injected by an equal number of nozzles (7) mounted on the special header (8).
The number of nozzles is 13 in the 21,000 kcal/h version, 15 in the 24,000 kcal/h version and 16 in the 27,000 kcal/h version .
Ignition occurs by means of an electronic board (*unit*) which controls the ignition electrode (5) and detection electrode (4).

Ignition electrodes (5)
They are controlled by the ignition unit that generates an electric discharge between the two electrodes.
They are mounted on the front of the burner between the first and the second gas ramp *(Venturi tube)*.

Detection electrode (4)
This is controlled by the ignition unit and detects burner ignition.
It is positioned on the front of the burner on the ramp alongside the ignition electrodes.



GAS ADJUSTMENTS

Max and minimum gas pressure adjustments can be made respecting the values shown on the page's 31 and 32.

- SIT 845 VALVE

After having connected the leads of a differential pressure gauge to the gas valve outlet (4) and to the positive pressure connector at the top of the sealed chamber (*see figure*), do the following :

Maximum pressure setting

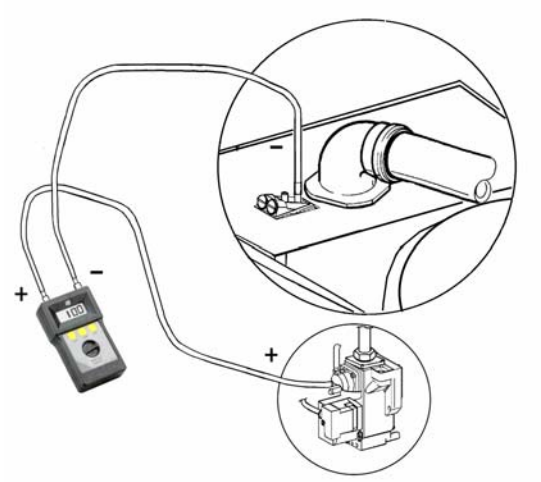
- Do a d.h.w. request *(open a tap)* and setting the temperature selector at maximum.

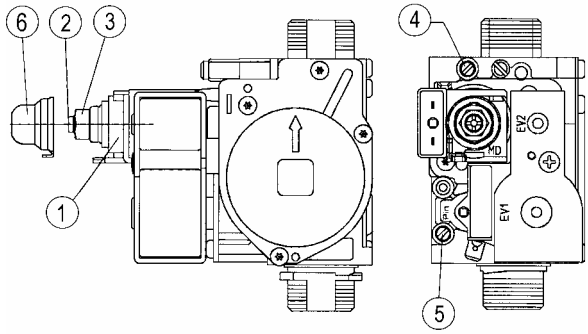
Turn nut "3" clockwise to increase the pressure to the burner and counter-clockwise to reduce it.

Minimum pressure setting

(to carry out after the maximum pressure setting)

- After cutting off the power supply to the modulation coil, turn screw "2" clockwise to increase the pressure to the burner and counter-clockwise to reduce it.





1) Modulation coil
2) Min. power setting screw
3) Max. power setting screw
4) Gas valve outlet pressure connector
5) Gas valve inlet pressure connector
6) Protective cap

- CHANGING TYPE OF GAS

Adaptation to a type of gas different to that for which the boilers are intended, can be done by using the special kits *(natural gas or LPG)*.

The changeover consists in replacing the burner nozzles and in moving to the modulation board of the "NATURAL GAS- LPG" (CM3) bridge.

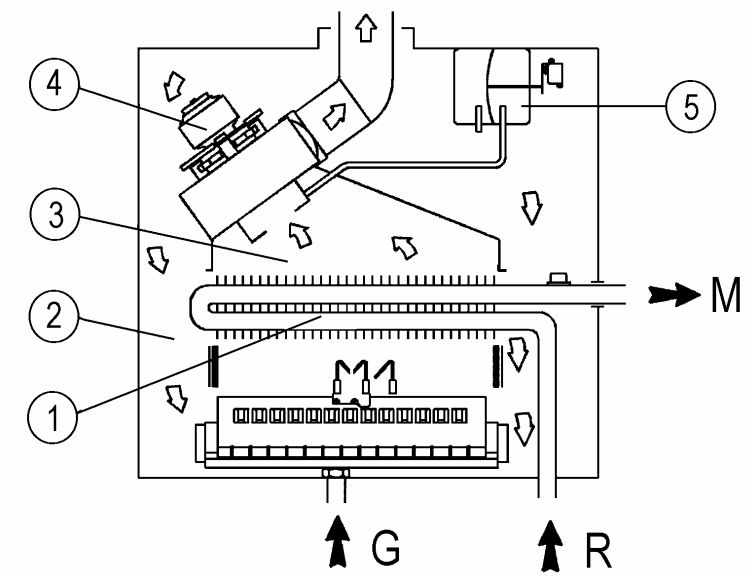
The minimum and maximum pressures are then set on the gas valve in the way described above.

Adjustment of the minimum and maximum output during the heating phase and of burner ignition pressure (*see table below*) can be done by means of the respective trimmers mounted on the modulation board *(see modulation board operation)*.

Soft ignition values in mbar (mm H_2O)

	Natural gas	LPG
ZEUS 21/24 Superior	25	65
ZEUS 27 Superior	23	70

FLUE CIRCUIT

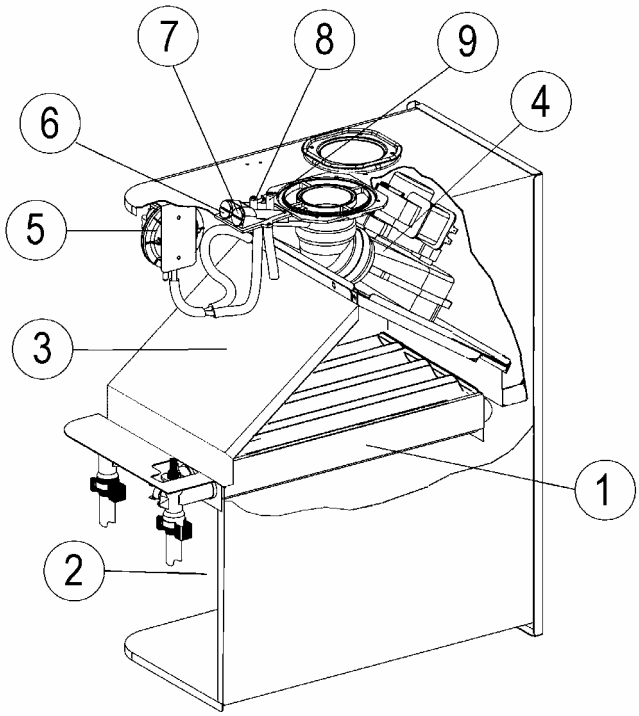


- OPERATION

The combustion residues, after investing the water-gas exchanger (1), are conveyed to a hood (3) at the top of which is a draught diverter (4).
Operation of the fan ensures forced extraction of the flues and at the same time creates a vacuum in the sealed chamber (2) that permits extraction of the combustion air from outside.
Correct flue extraction is controlled by a differential pressure switch (5), operation of which enables or does not enable burner ignition.

- AIR/FLUE SAMPLING TRAPS (6-7)

The top outer part of the chamber features two sumps with screw closing accessible from the front and through which combustion air (6) and flues (7) can be extracted.



- FLUE PRESSURE SWITCH SIGNAL PRESSURE POINT (8-9)

The top outer part of the sealed chamber features two pressure points with screw closing for measuring the signal at the ends of the flue pressure switch (5).
The negative pressure point (8) is linked through a Y-pipe to the top of the draught diverter and to the negative pressure point of the flue pressure switch.
The positive pressure point (9) is directly linked to the inside of the sealed chamber.

- FLUE PRESSURE SWITCH (5)

This is positioned in the top inner part of the sealed chamber and, by means of the points provided, reads the difference in pressure between the top of the draught diverter (the point where the extractor is positioned and operates) and the inside of the sealed chamber.
The signal measured from the pressure switch varies according to the length of the extraction/exhaust terminals and is measured by the special pressure points fitted to the top part of the sealed chamber (8-9).
Its operation causes a deviation of a switch contact that acts on the unit (IGN. UNIT) and enables or fails to enable burner ignition.

- FAN (4)

The extractor operates downstream of the combustion chamber and is physically "rested" on the top part of the hood (3) from which it extracts fumes into the exhaust pipes to which the boiler is linked.
It is controlled from the ignition unit and its operation coincides with that of the boiler.
The fans used differ according to the output of the appliance *(21,000, 24,000 and 27,000 kcal/h)*.

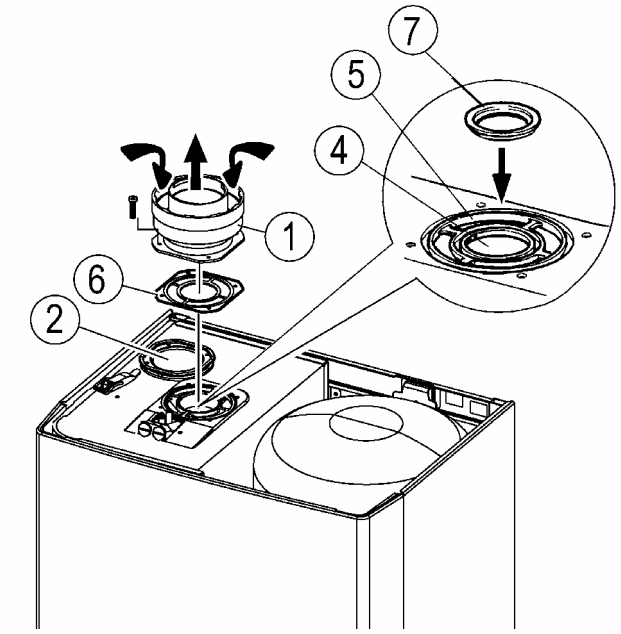
EXTRACTION AND EXHAUST SYSTEMS

(see extraction and exhaust end instructions)

ZEUS Superior is prearranged for connection to the special coupling type extraction and exhaust pipes.

- EXHAUST

Connection to the exhaust pipes is done by means of a flange (1) or a flanged curve to be fastened to the union (4) on the top part of the sealed chamber after placing in between a special shaped seal (6).
The flange differs according to whether the doubled or concentric system is used. In the first case, the opening for extraction of combustion air (5) is closed, while in the latter case, this is used.
For correct boiler operation, a diaphragm (7) must be fitted on the exhaust (4) in between the flange used (1).
Diaphragms of different diameter are available which must be fitted according to the type of pipe and its length *(see boiler instruction booklet).*



- EXTRACTION

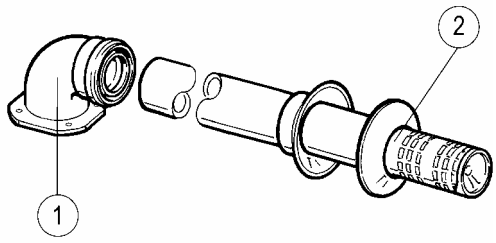
Using the doubled system, connection to the extraction pipes is done in the same way as the exhaust pipes, by connecting up to the 80 mm diameter hole on the top part of the sealed chamber.
The hole is normally closed by means of a special cap (2) equipping the boilers.
If coaxial pipes are used, extraction is done through the concentric hole outside the exhaust pipe (5).

- EXTRACTION EXHAUST KIT

The kits and relevant accessories make it possible to use four concentric systems and two doubled systems.
As regards pressure drop relating to each accessory, the various possible combinations and the use of the diaphragms to be fitted according to the length of the pipes, ***see the instructions concerning the extraction and exhaust ends (boiler instruction booklet).*** The accessories (*curves, extensions and end pieces*) are of the coupling type and seal is provided by special lip seals.

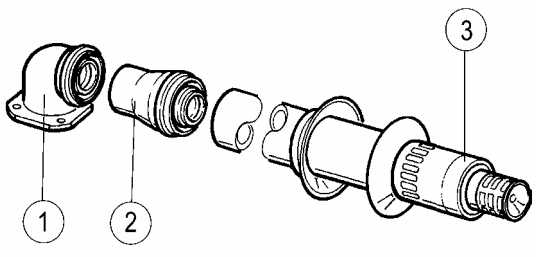
Coupling type horizontal concentric kit 60 /100

The exhaust pipe (ϕ 60 mm) is fitted inside the extraction pipe (ϕ 100 mm).
Connection to the boiler is made using a 90° curve (1) that can be positioned in any direction and which, by means of the necessary extensions, must be connected to the special extraction and exhaust end (2).
Max possible overall length beyond the first curve (1) is **3 straight and horizontal metres.**



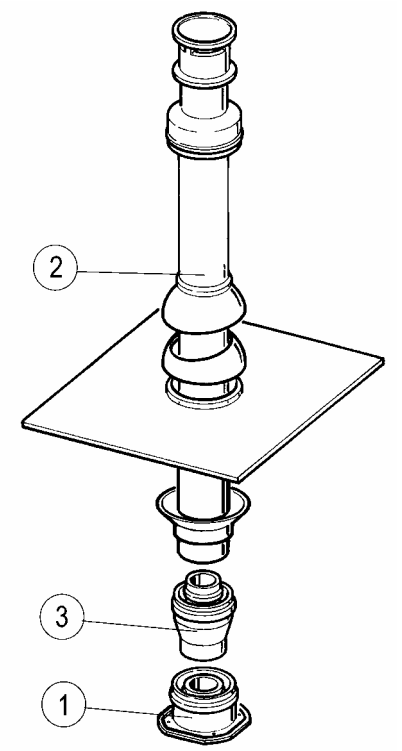
Coupling type horizontal concentric kit 80 /125

The exhaust pipe (ϕ 80 mm) is fitted inside the extraction pipe (ϕ 125 mm).
Connection to the boiler is made using a 90° curve diameter 60/100 (1) that can be positioned in any direction and which, by means of the adapter 60/100-80/125 (2) and necessary extensions, must be connected to the special extraction and exhaust end (3).
Max possible overall length beyond the first curve (1) is **7.3 straight and horizontal metres.**



Coupling type vertical concentric kit 60 /100

The exhaust pipe (ϕ 60 mm) is fitted inside the extraction pipe (ϕ 100 mm).
Connection to the boiler is made using a flange (1) that, by means of the necessary extensions, must be connected to the special 60/100 extraction and exhaust end with aluminium tile.
Max possible overall length is **4.7 straight and vertical metres.**

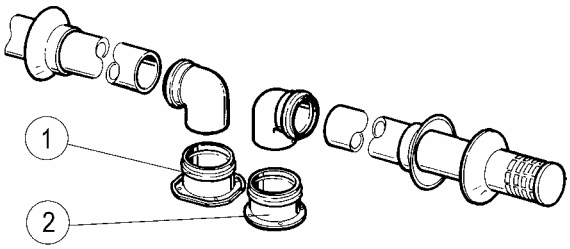


Coupling type vertical concentric kit 80 /125

The exhaust pipe (ϕ 80 mm) is fitted inside the extraction pipe (ϕ 125 mm).
Connection to the boiler is made using a flange (1) that, by means of the adapter 60/100-80/125 (3) and necessary extensions, must be connected to the special 80/125 extraction and exhaust end with aluminium tile (2).
Max possible overall length is **12.2 straight and vertical metres.**

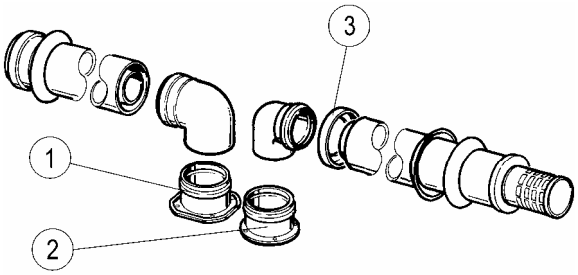
80/80 coupling type separator kit

Both pipes have a diameter of 80 mm.
Connections to the boiler are made using two special flanges for exhaust (1) from the centre pipe and extraction (2) from the side hole.
Max possible length *(extraction + exhaust)* **is 33 straight horizontal metres and 41 straight vertical metres.**
To prevent condensation problems, the exhaust pipe should not be more than **5 m long**

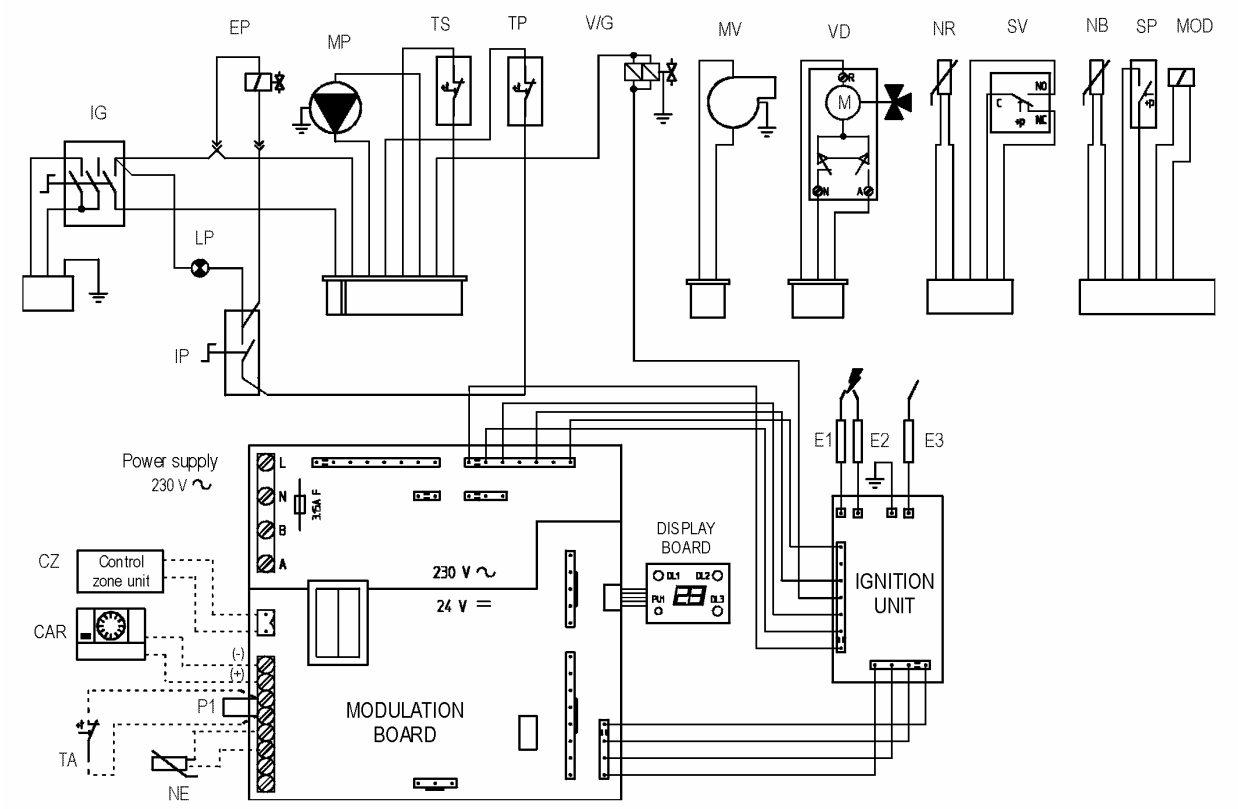


Insulated 80/80 coupling type separator kit

Both pipes have a working diameter of 80 mm.
Connections to the boiler are made using two special flanges for exhaust (1) from the centre pipe and extraction (2) from the side hole.
Insulation is obtained thanks to special seals (3) whereby an air space can be created by means of a ϕ 125 mm external concentric pipe.
Max possible length *(extraction + exhaust)* **is 33 straight metres.**
To prevent condensation problems, the exhaust pipe should not be more than **12 m long**



ELECTRICAL CIRCUIT



CAR	Remote control	IP	Gaudium Magnum switch	PU1	Reset button
CZ	Control xone unitt	LP	Gaudium Magnum operating indicator	SP	Pump pressure switch
DL1	Central heating operation LED			SV	Flue pressure switch
DL2	D.h.w. operation LED	MOD	Modulation coil	TA	Room thermostat
DL3	Flame LED	MP	Circulator	TP	Max flow limit thermostat
E1/E2	Ignition electrodes	MV	Fan	TS	Overheat. safety thermostat
E3	Detection electrode	NB	D.h.w. NTC sensor	VD	Electric three-way valve
EP	Gaudium Magnum solenoid valve	NE	External sensor *(optional)*	V/G	Gas valve
F	Fuse	NR	Central heating NTC sensor		
IG	Main switch	P1	Room thermostat jumper		

The electric circuit is interlocked with a microprocessor electronic board that controls boiler functions. The control and safety devices work in part at mains voltage and in part at low voltage.

230 V AC CIRCUIT

SAFETY DEVICES AND CONTROLS

Detection electrode (E3)	This detects ignition of the burner by whose flame it is invested. It is connected to the detection circuit of the ignition unit.	
Fuse	This interrupts power to the circuit when amp draw is over 3.15 A. It is fitted on the modulation board.	Fuse 3.15 A 250 V
"Gaudium Magnum" switch (IP)	Enables the operation of the Gaudium Magnum solenoid valve (EP), which is supplied by the maximum flow limit thermostat (TP). **0** - solenoid valve closed *(not supplied)* **- solenoid valve enabled** (supplied by the closing of the maximum flow limit thermsostat switch) (TP)	2-contacts switch

Main switch (IG)	Depending on position, this allows: **0** - circuit not powered - d.h.w. and CAR function *(optional)* - d.h.w. and central heating function.	3-position switch
Max flow limit thermostat (TP)	It is screw up on the external wall of the storage tank. With the Gaudium Magnum switch (IP) in position, powers the solenoid valve of the Gaudium Magnum device (EP) when measures a temperature higher than 50 ºC. Interrupts electrical supply when the temperature falls below 41 ºC.	Clicson double-contact thermostat
Overheat. safety device (TS)	When the safety temperature (100 ºC) is exceeded, this interrupts power to the main coils of the gas valve. It is positioned on the flow pipe at the primary exchanger outlet.	Clicson double-contact thermostat

LOADS

3-way electric valve (VD)	Deviates the flow of water of the primary circuit from the heating circuit to the boiler coil and vice versa. It is powered by the modulation board.
Circulator (MP)	Permits circulation of water in the primary circuit. This is powered by the modulation board whenever there is a demand for d.h.w., heating or antifreeze.
Fan (MV)	Ensures the flow of air inside the sealed combustion chamber and the exit of flues produced by combustion. Powered by the modulation board.
Gas valve (V/G) ***(main coils)***	This is powered by the ignition control unit when the burner has to be ignited. Permits flow of gas to the burner.
"Gaudium Magnum" electro valve (EP)	Permits to increase the maximum available flow of domestic hot water *(see Gaudium Magnum operation).* Powered when the "Gaudium Magnum (IP) is in position and by the maximum flow limit thermostat (TP)
"Gaudium Magnum" (LP) operating indicator	Displays on the control panel the operation of the "Gaudium Magnum" function.. Is a green lamp connected in parallel to the "Gaudium Magnum" solenoid valve(EP).
Ignition control unit (IGN. UNIT)	Controlled by the modulation board when the burner has to be ignited. Controls the devices needed for ignition *(gas valve, ignition electrodes)* and flame detection *(ionisation electrode).*
Ignition electrodes (E1 - E2)	These provoke an electric spark that ignites the air/gas mix. They are controlled by the control unit ignition transformer (IGN. BOARD)
Modulation board	This is powered when the main switch (IG) is positioned in *(summer or CAR)* or *(winter) (see modulation board operation).*

LOW-VOLTAGE CIRCUIT
SAFETY DEVICES AND CONTROLS

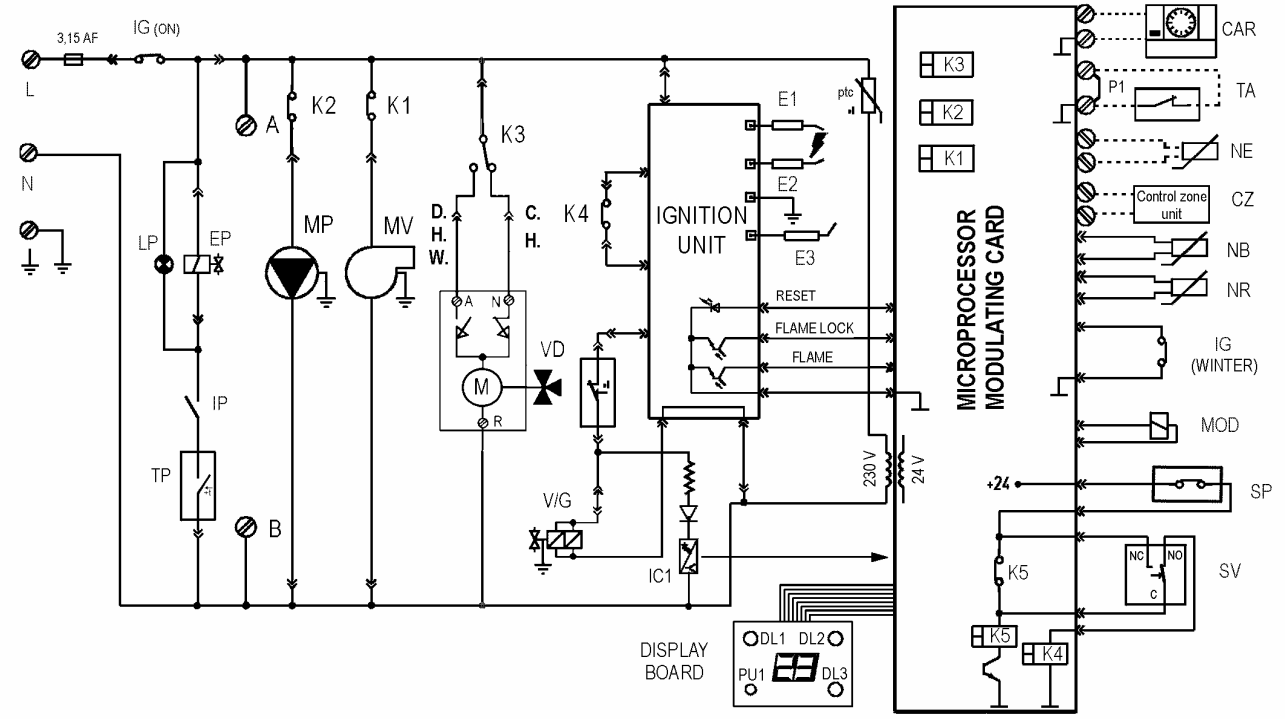
Central-heating sensor (NR)	Allows the modulation board to detect the temperature of the primary circuit water flow. If this sensor stops working, burner operation stops both in central-heating and d.h.w. modes. It is positioned at the outlet of the main exchanger.	Sensor NTC 10 kohm 25 ºC
Control zone unit (CZ) ***(external optional)***	Permits boiler operation with 3 area valves /external pumps controlled by respective room thermostats. Zone 1 is controlled *(times/temperatures)* by means of the CAR *(if fitted)*.	See control unit zone operation
Domestic hot water sensor (NB)	This enables the modulation board to detect the temperature of the hot water in the storage tank. Its failure stops burner operation in domestic hot water phase. It is inserted inside a bulb holder in contact with the external wall of the cylinder.	Sensor NTC 10 kohm 25 ºC
External sensor (NE) ***(external optional)***	Detects external temperature and enables the modulation board to change the system flow temperature according to outside temperature.	Sensor PTC 1 kohm 25 ºC
Flue pressure switch (SV)	This acts on the modulation board and enables burner operation when flue expulsion occurs correctly. If this is closed with the fan off, the ignition cycle will not start.	2-position switch
Pump pressure switch (SP)	This acts on the modulation board and permits interrupting power to the control unit in the event of there being no circulation in the boiler circuit.	Double-contact switch
Remote control (CAR) ***(external optional)***	Permits remote control of boiler *iSUM/WINT switch, temperature adjustment and indication, alarm display, reset, etc.)* and acts as a weekly chrono-thermostat. Together with the external sensor (NE), allows the modulation board to change the system flow temperature according to need.	See Remote Friend Control operation (CAR)
Room thermostat (TA) ***(external optional)***	This enables operation in central heating phase when the room temperature is below that required. In case of CAR installation, the room thermostat must be disconnected without resetting the pre-existing jumper P1.	Double clean-contact switch

LOADS

Display board	This displays burner operation *(orange LED),* operation in d.h.w. phase (*green LED)* and in central-heating or antifreeze phase *(green LED*) on the control panel. By means of a dispaly, it indicates the temperature of the boiler, the temperatures set for d.h.w. and central-heating and the error codes *(see modulation board operation).*
Modulation coil (MOD)	This is powered by the modulation board with variable direct current. It permits changing gas pressure to the burner.

ELECTRICAL CIRCUIT

CENTRAL-HEATING PHASE



Operation with room thermostat

When the mainr switch (IG) is in WINTER position, it powers the modulation card and enables operation in central heating mode.
When the room thermostat contact (TA) is closed, the low-voltage circuit starts the pump (MP) by closing the contact of relay K2.
The circulation of water causes the pump pressure switch (SP) to close and, because this is connected in series with the NC contact of the flue pressure switch (SV), the coil of relay K5 is energised.
Meanwhile, the adjustment circuit causes the deviation of the relay contact K3.
This way, the motor (M) of the 3-way valve (VD) is powered and continues to operate until the limit switch "N" opens once the central heating position has been reached.
If the temperature read by the NTC heating sensor (NR) is below that set on the control panel with the heating potentiometer, the low-voltage circuit excites the relay K5 and starts the fan (MV) commanding the relay K1.
The consequent deviation of the flue pressure switch (SV) powers the relay K4 the contact of which, on closing, enables the control unit (IGN. UNIT) to start the ignition cycle, commanding first of all the ignition electrodes (E1-E2) and then, with the consensus of the overheating thermostat (TS), both the main coils of the gas valve (V/G).
Ignition of the burner is detected by the control unit (IGN. UNIT) by means of the ionisation electrode (E3).

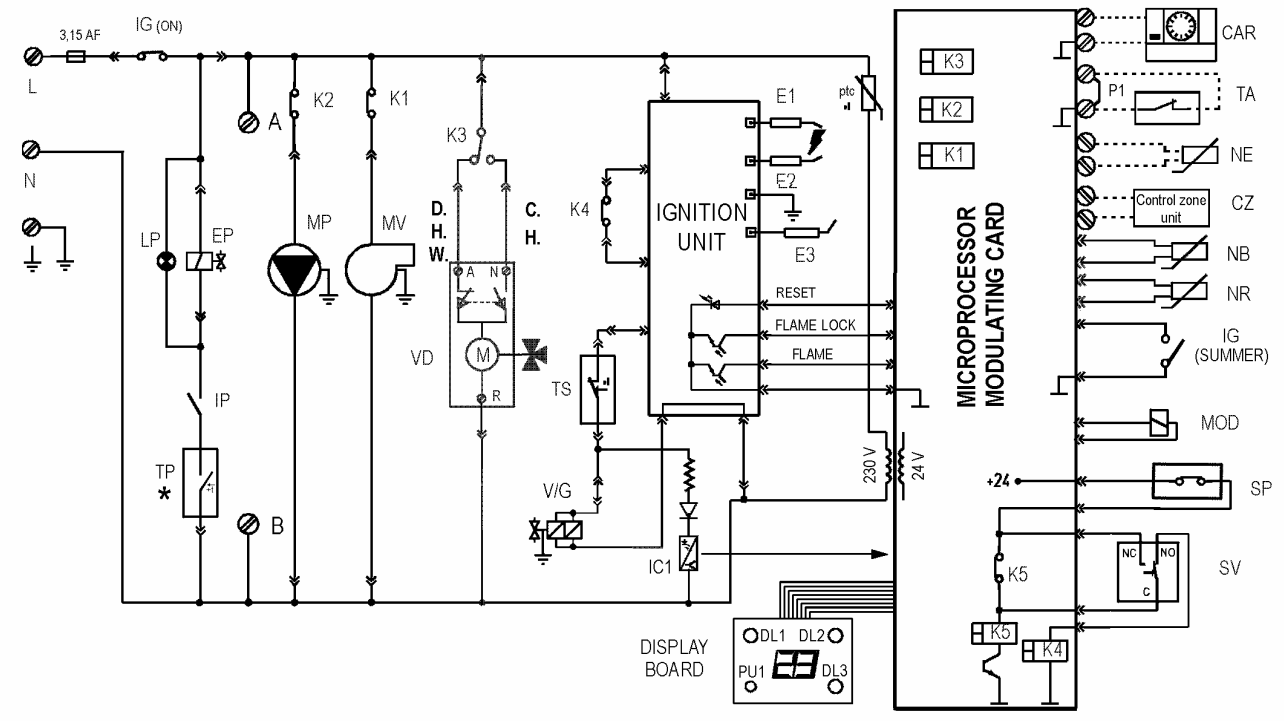
Operation with Remote Friend Control

The main switch (IG) in SUMMER position powers the modulation board and remote control (CAR).
If the conditions found by the remote control (CAR) require ignition in central heating phase (*SUM/WINT switch in WINTER position, central-heating temperature setting above that read by the central-heating sensor NR, request by the time programmer, room temperature adjustment above that read)*, the board powers pump MP through relay K2 contact.
Burner ignition then occurs as described above.

NOTE: In both cases, at each switch-off due to temperature having been reached, the modulation board stops burner operation during central-heating phase for 180 seconds., which can be reduced to 30 seconds by intervening on the special jumper *(J1) (see modulation card operation).*

ELECTRICAL CIRCUIT

D.H.W. PHASE



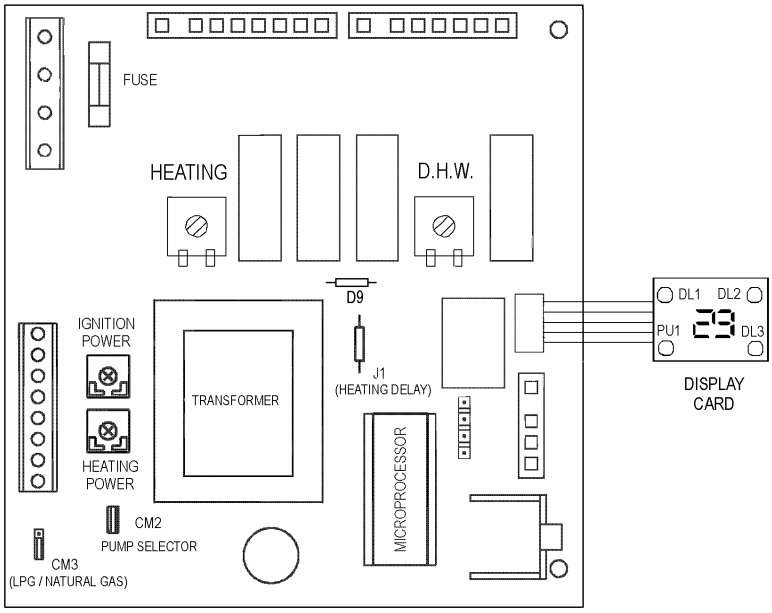
Operation

When the main switch (IG) is in SUMMER or WINTER position, it powers the modulation board and enables operation in d.h.w. mode.
When the temperature read by NTC d.h.w. sensor (NB) is below that set on the control panel (*or on the CAR if fitted*), the adjustment circuit starts the pump (MP) by means of the contact of relay K2.
The circulation of water causes the pump pressure switch (SP) to close and, because this is connected in series with the NC contact of the flue pressure switch (SV), the coil of relay K5 is energised.
Meanwhile, the adjustment circuit causes the deviation of the relay contact K3.
This way, the motor (M) of the 3-way valve (VD) is powered and continues to operate until the limit switch "A" opens once the d.h.w. position has been reached.
The low-voltage circuit excites the relay K5 and starts the fan (MV) commanding the relay K1.
The consequent deviation of the flue pressure switch (SV) powers the relay K4 the contact of which, on closing, enables the control unit (IGN. UNIT) to start the ignition cycle, commanding first of all the ignition electrodes (E1-E2) and then, with the consensus of the overheating thermostat (TS), both the main coils of the gas valve (V/G).
Ignition of the burner is detected by the control unit (IGN. UNIT) by means of the ionisation electrode (E3).

Operation with Gaudium Magnum"

When the Gaudium Magnum switch is in position, the contact of the switch "IP" is closed.
The solenoid valve EP and the lamp LP are powered when the main switch (IG) is "ON" position (SUMMER or WINTER) and the max d.h.w. flow limit (TP) thermostat switch is closed.

MODULATION BOARD



The boiler is equipped with a microprocessor-controlled electronic board used on both the models with 3-way electric valve (*Zeus Superior, Eolo Superior Plus*) and on the models with central-heating and d.h.w. pumps (*Hercules*).
The different type of operation is obtained by adjusting **diode D9** ***(diode engaged = electric 3-way valve, diode disengaged = double pump).***
The board is connected to a terminal board (DISPLAY CARD) which, by means of LEDs and a display panel, indicates the state of operation of the appliance.
The board is powered with main switch (IG) in position *(summer)* or (*winter)*.

Central-heating request with room thermostat

With the main switch (IG) in WINTER position and the contact of the room thermostat (TA) closed, the low-voltage circuit starts the circulator (MP) by means of relay "K2" and powers the motor (M) of the 3-way valve (VD) through the contact of relay "K3".
The circulation of water results in the closing of the pump pressure switch (SP) which, because it is connected in series to the NC contact of the flue pressure switch (SV) powers the coil of relay "K5".
If the temperature detected by means of NTC central heating sensor (NR) is below that set on the control panel by means of the central heating potentiometer (HEATING), the adjustment circuit excites relay "K5" and starts the fan (MV) controlled by relay "K1".
The consequent deviation of the contact of the flue pressure switch (SV) results in relay "K4" being powered and the relevant contact closing.
This powers the control unit (IGN. UNIT) and starts the ignition cycle.
During the ignition phase, the current to the modulation coil is restricted by the adjustment made with the soft ignition trimmer (POT ACC.).
Once the flame has been detected *(signal from control unit)*, the signal to the coil (MOD) is changed in a manner directly proportionate to the difference between the temperature set with the central-heating potentiometer (HEATING) and that detected by means of the NTC central-heating sensor (NR) and, if necessary, reaches maximum set value in 50 seconds *(maximum central-heating output)*.
When the set value is exceeded, the contact of relay "RT" is opened with consequent switch-off of the burner.
Re-ignition of the burner for the same request remains inhibited for 180 s / 30 s.

Central-heating request with Remote Friend Control

If the conditions detected by the remote control (CAR) require ignition in central-heating phase (*SUM/WINT switch of CAR in WINTER position, time programmer request, room temperature setting above that found*), the low-voltage circuit starts the circulator (MP) by means of relay K2 and powers the motor (M) of the 3-way valve (VD) by means of the contact of relay "K3".

The circulation of water results in the closing of the pump pressure switch (SP) which, because it is connected in series to the NC contact of the flue pressure switch (SV) powers the coil of relay "K5".
If the temperature detected by means of NTC central-heating sensor (NR) is below that set by means of the central heating potentiometer of the remote control (CAR), the adjustment circuit excites relay "K5" and starts the fan (MV) controlled by relay "K1".
The consequent deviation of the contact of the flue pressure switch (SV) results in relay "K4" being powered and the relevant contact closing.
This powers the control unit (IGN. UNIT) and starts the ignition cycle, which continues in the same way as the central-heating request with room thermostat.
Once the flame has been detected, the signal to the modulation coil is changed in a manner directly proportionate to the difference between the boiler and room temperatures set and detected and, if necessary, reaches maximum set value in 50 seconds *(maximum central-heating output)*.
When the set value is exceeded, the contact of relay "RT" is opened with consequent switch-off of the burner.
Re-ignition of the burner for the same request remains inhibited for 180 s / 30 s.

Domestic hot water request

If the temperature read by the NTC sensor on the storage tank (NB) is below that set by means of the d.h.w. potentiometer (D.H.W.), the low-voltage circuit starts the pump (MP) by means of relay "K2 and powers the motor (M) of the 3-way valve (VD) through contact of relay "K3".
Following consequent closing of pump (SP) pressure microswitch, burner ignition proceeds in the same way as for central-heating phase.
Flame modulation occurs with reference to the flow temperature read by the central-heating sensor (NR) which is changed according to the difference between the temperature set by means of the d.h.w. potentiometer (D.H.W.) and that measured by the d.h.w. sensor (NB).
When the temperature measured by the d.h.w. sensor (NB) exceeds that requested, the contact of relay K4 is opened and after post-operation times also the contacts of relays "K2" *(pump)* and "K1" *(fan)*.
When the temperature drops again, the relays are once again powered to start the new ignition cycle.

If, during operation, the heating sensor. (NR) measures a flow temperature higher than 87 ºC, the contact of relay K4is opened. This is closed again just as soon as the temperature drops to 75 ºC.

Central-heating antifreeze request

With the main switch (IG) in SUMMER or WINTER position, if the temperature read by the NTC central-heating sensor falls below 4 ºC, the board allows ignition in central-heating mode and keeps the boiler operating with the burner at minimum output until a boiler temperature of 42°C is reached.

Domestic hot water request

With the main switch (IG) in SUMMER or WINTER position, if the temperature read by the NTC d.h.w. sensor (NB) falls below 4 ºC, the board allows ignition in d.h.w. mode and keeps the boiler operating with the burner at minimum output until the d.h.w. (NB) sensor reads a temperature of 8°C.

During operation, the water in the primary circuit remains below 42°C because when such temperature is reached, the board switches off the burner.

"Chimneysweep" request

When the reset button (PU1) is pressed for at least 10 seconds, as soon as this is released, the board gives the signal for boiler ignition and keeps this operating in central-heating mode at max heating output for 15 minutes.
In this phase, only the limit thermostat function is operative *(90 ºC)* performed by the central-heating sensor.
The function is only engaged if there are no requests under way for central-heating, domestic hot water or antifreeze and it is indicated by means of code "7" on the display panel and by the flashing of central-heating (DL1) and d.h.w. (DL2) LEDs.
It can be interrupted by cutting power to the circuit.

INPUTS

Central-heating sensor (NR)	This is a resistance that varies in a way inversely proportionate to the temperature of the water flow in the primary circuit. It is used as a limit thermostat (90 °C).	Sensor NTC 10 kohm 25 °C
D.h.w. sensor (NB)	This is a resistance that varies in a way inversely proportionate to the temperature of the water contained in the storage tank.	Sensor NTC 10 kohm 25 °C
External sensor (NE) ***(external optional)***	This is a resistance that varies proportionately to the outside temperature. It enables the modulation board to change the system flow temperatures in accordance with the outside temperature.	Sensor PTC 1 kohm 25 °C
Flame detection (FLAME)	This is a signal from the ignition card indicating the flame has been detected. It enables the board to increase power to the modulation coil after restricting this during the ignition phase.	
Flame lock	This is a signal from the control unit (IGN. UNIT) that indicates burner ignition failure. The alarm is displayed with an error code on the display board display panel (E01) or, if fitted, on the remote control *(see CAR operation.)*.	230 Vac = flame lock 0 Vac = stand-by / burner ON
Flue pressure switch (SV)	This enables burner ignition by powering the relay "K4" when flue extraction occurs correctly. If the "NO" contact is closed with fan off will fail to enable the start of the ignition cycle.	2-position switch
Main switch (IG)	Indicates whether d.h.w. operation mode (SUMMER) or d.h.w. and central-heating mode (WINTER) are enabled.	closed=WINTER open = SUMMER
Overheating lock (IC1)	This is a signal which, through an optoinsulator, indicates input to the main coils of gas valve (V/G). This permits the board to pinpoint and indicate with an error code (E02) any operation of the safety overheat. thermostat (TS).	230 Vac = coils powered 0 Vac = coils not powered
Pump pressure switch (SP)	In case of locked pump or low pressure in the primary circuit, this does not enable burner ignition and interrupts power to relays "K4" and "K5".	Double-contact switch
Remote control (CAR) ***(external optional)*** ***(see CAR operation)***	This sends SUM/WINT switch signals to the board relating to d.h.w. and central-heating temperature adjustment and central heating request *(time ,room temperature)*. When the CAR is fitted, the room thermostat must be disconnected <u>without</u> restoring the pre-existing jumper P1.	
Reset button (PU1)	When this is pressed, the circuit is released after the overheating and no-ignition safety device has tripped (100 °C). If this is kept pressed during operation, the gas pressure is maintained at soft ignition level. If this is kept pressed for at least 10 seconds in the absence of any requests, when it is released the "chimneysweep" function is engaged.	Double-contact button
Room thermostat (TA) ***(external optional)***	This is a clean-contact switch that enables operation in central-heating phase, when the room temperature is below that requested.	open = heating OFF closed = heating ON
Zone control unit (CZ) ***(optional)***	This sends signals to the board relating to operation requests for any connected zone valves / external pumps *(see control zone unit operation)*.	

OUTPUTS

3-way valve relay (K3)	This relay permits powering the motor of the 3-way electric valve (VD). It is excited by a central-heating request and remains idle with a d.h.w. request.
Control zone unit (CZ) ***(optional)***	This signal enables the control zone unit to know the operating condition of the appliance *(d.h.w./heating)* and, if fitted, to recognise the CAR as area 1 room thermostat *(see control zone unit operation).*
Fan relay (K1)	This single-pole relay commands the fan (MV) which is excited when operation is required.
Modulation coil (MOD)	This is a D.C. signal that commands the modulation coil of the gas valve. Permits changing the pressure of the gas to the burner.
Pump relay (K2)	This is a single-pole relay that powers the circulator (MP) and which is excited when operation is required.
Remote control (CAR) ***(external optional)*** ***(see CAR operation)***	This signal permits displaying on the remote control panel the boiler temperature, operation in d.h.w. or central-heating modes, the codes of the alarms that have tripped and the temperature read by any external probe.
Request relay (K4)	This is a single-pole relay that is excited when the burner has to be ignited. By means of its contact, the ignition control unit is commanded (IGN. BOARD).
Reset	This signal releases the ignition control unit after the overheating or ignition failure safety devices have tripped. The operation is performed on the boiler control panel by means of reset button PU1 or, if fitted, on the remote control panel *(see CAR operation).*

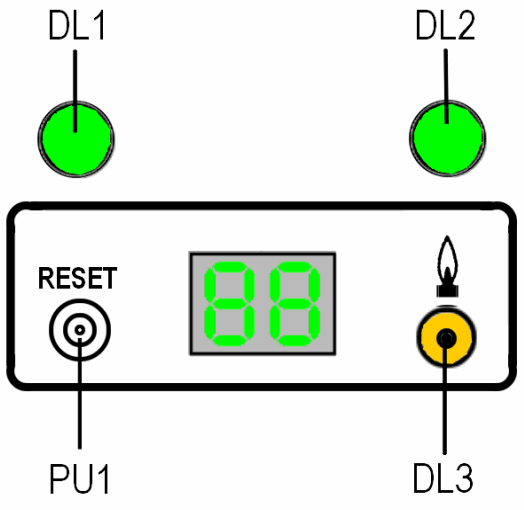
ADJUSTMENTS

C.-heating potentiometer (HEATING)	Permits setting the temperature of the water for central-heating use between 38ºC and 85 ºC.	
Central-heating timing (J1)	At each switch-off due to temperature being reached during central-heating, a delay is engaged of 3 min / 30 s until the next re-ignition for the same type of request.	absent = 30 s present = 3 min
D.h.w. potentiometer (D-H-W.)	Permits setting the temperature of d.h.w. between 20 ºC and 60 ºC.	
Gas selector (CM3)	Depending on the position *(natural gas/LPG),* adapts the modulation parameters to the gas for which the boiler is set.	
Heating power trimmer (HEATING POWER)	Permits regulating the output during heating phase and adapting this to the needs of the system *(from min up to max regulated on the gas valve).*	
Pump switch (CM2)	With the SUM/WINT switch in WINTER position, this enables circulator operation in continuous mode or only at the request of the room thermostat.	absent = continuos operat. present = room thermo. request operation
Soft ignition trimmer (IGN. POWER.)	Permits regulating the power to the modulation coil and consequently the pressure of the gas to the burner during the ignition phase *(from min up to 2/3 of max regulated on the valve).* By keeping the reset button (PU1) pressed during d.h.w. or central-heating, the power to the coil is blocked at the soft ignition setting.	

SAFETY DEVICES

Circulator antilock	The circulator (MP) is operated for 150 seconds after: - 24 hours of inactivity with the SUM/WINT switch in SUMMER position - 3 hours of inactivity with the SUM/WINT switch in WINTER position *(radiator antifreeze)*.
Delivery overheating ventilation	If the temperature of the primary circuit read by the NTC central-heating sensor (NR) exceeds 97°C, the fan is started until the temperature drops below 93 ºC.
NTC sensors faulty (NR and NB)	The breakage of the d.h.w. sensor (NB) prevents operation in d.h.w. phase. The breakage of the heat. sensor (NR) prevents operation in central-heating or d.h.w mode.
Pump post-circulation	To avoid overheating the water/gas exchanger, the pump is kept operating for: - 150 seconds after a central heating, chimneysweep and heating antifreeze request - 60 seconds after a d.h.w. request *(in this case the electric 3-way valve is maintained in d.h.w. position)*
Sealed-chamber post-ventilation	After burner switch-off after any type of request, the combustion chamber is washed and the fan kept operating for 30 seconds.

INDICATORS
(display card)



DL1	This green LED lights up when the boiler is working in central-heating and antifreeze mode.
DL2	This green LED lights up when the boiler is working in d.h.w. mode.
DL3	This orange LED lights up when the burner is operating.
Display	Depending on the condition, this indicates: - the value of the temperature detected by the delivery sensor (NR) during operation in central-heating, d.h.w., antifreeze and chimneysweep mode. - The value set during the heating and domestic hot water circuit temperature adjustment *(for 5 seconds)*. - the letters CE with the CAR installed and the main switch in position - The code number of the safety device that has tripped **01** = no ignition lock **02** = overheating safety device thermostat lock **03** = flue pressure switch contact not deviated (NO) **05** = NTC flow sensor faulty **10** = pump pressure switch safety **11** = flue pressure switch contact not at rest (NC) **12** = domestic hot water NTC sensor faulty *(storage tank NTC)* **14** = connection between ignition control unit and board not correct or ignition control unit faulty **31** = incompatible or faulty remote control *(optional)*

ZEUS Superior OPERATION SEQUENCE

Central-heating mode

POWER SUPPLY
Main switch in WINTER position

⇓

MODULATION CARD AND C.A.R. (*remote control*) **POWER SUPPLY**
When the main switch contacts close *(WINTER position)* the modulation board and C.A.R. (*if fitted*) are powered and operation in central-heating mode is enabled

⇓

CLOSING OF ROOM THERMOSTAT SWITCH / *CAR OPERATION REQUEST*
Room thermo. or CAR (*if fitted*) request detects conditions that require operation in central-heating phase

⇓

PUMP AND 3-WAY VALVE POWER SUPPLY
The modulation board powers the circulator and the electric 3-way valve
The valve is moved to central-heating position

D.h.w. mode

POWER SUPPLY
Main switch in SUMMER or WINTER position

⇓

MODULATION CARD AND C.A.R. (*remote control*) **POWER SUPPLY**
When the main switch contacts close *(SUMMER position)* the modulation board and C.A.R. (*if fitted*) are powered and operation in d.h.w. is enabled

⇓

DOMESTIC HOT WATER OPERATION REQUEST
Storage tank water temperature below that set

⇓

PUMP AND 3-WAY VALVE POWER SUPPLY
The modulation board powers the circulator and the electric 3-way valve.
The valve is moved to d.h.w. position

⇓

CLOSING OF PUMP PRESSURE MICROSWITCH
The circulation of water inside the primary circuit causes the closing of the pump pressure switch

⇓

FLUE PRESSURE SWITCH CONTACT CONTROL
The card checks the correct position of the flue pressure switch *(contact NC normally closed)*

⇓

FAN POWER SUPPLY
The modulation board powers the fan

⇓

FLUE PRESSURE SWITCH CONTACT CONTROL
The modulation board checks the deviation of the flue pressure switch contact following fan operation *(contact NO normally open)*

⇓

IGNITION CONTROL UNIT POWER SUPPLY
The modulation board controls the ignition control unit

⇓

IGNITION ELECTRODES POWER SUPPLY
The ignition unit powers the ignition electrodes

⇓

GAS VALVE POWER SUPPLY
With the consensus of the overheating thermostat, the ignition unit powers the gas valve coils.

⇓

BURNER IGNITION *(SOFT)*
For a few seconds, the board conveys soft-ignition power to the modulation coil

⇓

FLAME DETECTION
By means of the ionisation electrode, the ignition cardt detects burner ignition and conveys the burner ignition signal to the modulation board

⇓

BOILER OPERATION
The burner operates at an output that varies according to the type of request, the adjustments/settings made and the temperatures read by the NTC sensors

ZEUS Superior TECHNICAL DATA

		ZEUS 21	ZEUS 24	ZEUS 27
Nominal heating capacity	kW (Kcal/h)	26,6 (22901)	30,49 (26116)	34,3 (29508)
Minimum heating capacity	kW (Kcal/h)	10,9 (9401)	12,3 (10539)	14,7 (12647)
Maximum heat output (useful)	kW (Kcal/h)	24,4 (21000)	27,9 (24000)	31,4 (27000)
Minimum heat output (useful)	kW (Kcal/h)	9,3 (8000)	10,5 (9000)	12,5 (10750)
Useful heating efficiency at nominal output	%	91,7	91,9	91,5
Useful heating efficiency at 30% nominal output	%	88,1	87,3	89,5
Heat losses at the casing with burner on / off	%	1,50 / 0,95	1,0 / 0,85	1,0 / 0,63
Heat losses at the chimney with burner on / off	%	6,8 / 0,07	7,1 / 0,06	7,5 / 0,02
Nozzles diameter **(G20)**	mm	1,30	1,30	1,30
Gas supply pressure **(G20)**	mbar (mm H_2O)	20 (204)	20 (204)	20 (204)
Nozzles diameter **(G30)**	mm	0,75	0,75	0,78
Gas supply pressure **(G30)**	mbar (mm H_2O)	29 (296)	29 (296)	29 (296)
Nozzles diameter **(G31)**	mm	0,75	0,75	0,78
Gas supply pressure **(G31)**	mbar (mm H_2O)	37 (377)	37 (377)	37 (377)
Max operating pressure of heating circuit	bar	3	3	3
Max operating temperature of heating circuit	ºC	90	90	90
Adjustable heating temperature	ºC	38 - 85	38 - 85	38 –85
Total volume of expansion vessel	l	8	8	10
Expansion vessel preloading	bar	0,8	0,8	0,8
Amount of water in boiler	l	3,5	4,0	4
Available head capacity 1000 l/h	kPa (m H_2O)	29,4 (3,0)	30,4 (3,1)	34,3 (3,5)
Domestic circuit hot water production useful heat output	kW (Kcal/h)	24,4 (21000)	27,9 (24000)	31,4 (27000)
Domestic hot water circuit water adjustable temperature	ºC	20 - 60	20 - 60	20 – 60
Flow limiter	l/min	10	12	10
Flow limiter plus Gaudium Magnum	l/min	16	18	16
Domestic hot water circuit max. operating pressure	bar	8	8	8
Specific D.H.W. flow rate with ΔT 30ºC	l/min	15,2	16,4	19,0
Specific D.H.W. flow rate in cont. service with ΔT 30ºC	l/min	11,4	13,3	15,0
Storage tank capacity	l	60	60	60
Full boiler weight	kg	138	140	140
Empty boiler weight	kg	74	76	76
Power connection	V / Hz	230 / 50	230 / 50	230 / 50
Rated input	A	0,67	0,75	0,90
Installed power	W	140	155	180
Power absorbed by circulator	W	78	90	100
Power absorbed by fan	W	35	35	49
Appliance electrical system protection	-----	IPX4D	IPX4D	IPX4D

COMBUSTION PARAMETERS

(with combustion air temperature 15 °C)

		ZEUS 21 Superior			ZEUS 24 Superior			ZEUS 27 Superior		
		G20	G30	G31	G20	G30	G31	G20	G30	G31
Rated power flue gas mass flow rate	kg/h	56	65	65	67	70	72	73	83	82
Minimum power flue gas mass flow rate	kg/h	57	71	71	69	77	76	81	89	89
CO_2 at rated power	%	6,8	6,7	6,7	6,5	7,1	6,9	6,5	6,8	6,7
CO_2 at minimum power	%	2,6	2,4	2,4	2,4	2,5	2,5	2,5	2,7	2,8
CO at 0% O_2 at rated power	ppm	117	75	54	90	59	36	64	81	33
CO at 0% O_2 at minimum power	ppm	70	106	128	95	137	120	72	95	122
No_x at 0% O_2 at rated power	ppm	138	213	180	174	197	191	152	225	201
No_x at 0% O_2 at minimum power	ppm	88	102	95	89	110	99	70	104	102
Flue gas temperature at rated power	°C	123	122	125	120	125	131	124,4	116,7	116,0
Flue gas temperature at minimum power	°C	96	93	101	93	103	102	101,2	95,6	99,2

ZEUS 21 Superior HEAT OUTPUT ADJUSTMENTS

		NATURAL GAS (G20)			BUTANE (G30)			PROPANE (G31)		
Heat output (Kcal/h)	Heat output (kW)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	(mm H_2O)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	(mm H_2O)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	(mm H_2O)
21000	24,42	2,82	10,4	106	2,10	28,3	288	2,07	36,3	370
20000	23,26	2,69	9,5	97	2,00	25,9	264	1,97	33,6	343
19000	22,09	2,56	8,7	89	1,91	23,6	241	1,88	31,0	316
18000	20,93	2,44	7,9	81	1,82	21,4	219	1,79	28,5	291
17000	19,77	2,31	7,2	73	1,72	19,4	198	1,70	26,1	266
16000	18,60	2,19	6,5	66	1,63	17,5	178	1,60	23,7	242
15000	17,44	2,06	5,8	59	1,53	15,6	159	1,51	21,4	218
14000	16,28	1,93	5,1	52	1,44	13,9	142	1,42	19,2	196
13000	15,12	1,81	4,5	46	1,35	12,3	125	1,33	17,0	174
12000	13,95	1,68	3,9	40	1,25	10,8	110	1,23	14,9	152
11000	12,79	1,55	3,4	35	1,16	9,3	95	1,14	12,9	131
10000	11,63	1,42	2,9	29	1,06	8,0	81	1,04	10,9	111
9000	10,47	1,29	2,4	24	0,96	6,8	69	0,95	8,9	91
8000	9,30	1,16	1,9	20	0,86	5,6	57	0,85	7,0	72

ZEUS 24 Superior HEAT OUTPUT ADJUSTMENTS

		NATURAL GAS (G20)			BUTANE (G30)			PROPANE (G31)		
Heat output (Kcal/h)	Heat output (kW)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	($mm\ H_2O$)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	($mm\ H_2O$)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	($mm\ H_2O$)
24000	27,9	3,21	10,5	107	2,39	28,1	287	2,36	36,6	374
23000	26,7	3,09	9,6	98	2,30	25,9	264	2,27	34,3	350
22000	25,6	2,97	8,7	89	2,21	23,8	243	2,18	32,0	326
21000	24,4	2,85	7,9	81	2,12	21,8	222	2,09	29,7	303
20000	23,3	2,72	7,2	73	2,03	19,9	203	2,00	27,5	281
19000	22,1	2,60	6,5	66	1,94	18,1	184	1,91	25,4	259
18000	20,9	2,47	5,8	59	1,84	16,3	167	1,81	23,3	237
17000	19,8	2,35	5,1	52	1,75	14,7	150	1,72	21,3	217
16000	18,6	2,22	4,5	46	1,65	13,2	134	1,63	19,3	197
15000	17,4	2,09	4,0	41	1,56	11,8	120	1,53	17,4	177
14000	16,3	1,96	3,5	36	1,46	10,4	106	1,44	15,5	158
13000	15,1	1,83	3,0	31	1,36	9,2	94	1,34	13,7	140
12000	14,0	1,70	2,6	27	1,27	8,1	83	1,25	12,0	122
11000	12,8	1,57	2,3	23	1,17	7,1	73	1,15	10,3	105
10000	11,6	1,43	2,0	20	1,07	6,2	64	1,05	8,7	89
9000	10,5	1,30	1,7	17	0,97	5,5	56	0,96	7,1	73

ZEUS 27 Superior HEAT OUTPUT ADJUSTMENTS

		NATURAL GAS (G20)			BUTANE (G30)			PROPANE (G31)		
Heat output (Kcal/h)	Heat output (kW)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	($mm\ H_2O$)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	($mm\ H_2O$)	Burner gas flow rate (m^3/h)	Burner nozzle pressure (mbar)	($mm\ H_2O$)
27000	31,4	3,63	12,0	122	2,71	27,0	276	2,67	34,3	350
26000	30,2	3,50	11,2	114	2,61	25,1	256	2,57	32,6	333
25000	29,1	3,37	10,3	106	2,51	23,3	237	2,47	30,3	309
24000	27,9	3,24	9,6	98	2,42	21,5	219	2,38	28,1	286
23000	26,7	3,12	8,8	90	2,32	19,8	202	2,29	25,9	265
22000	25,6	2,99	8,1	83	2,23	18,2	186	2,19	23,9	244
21000	24,4	2,86	7,4	76	2,13	16,7	170	2,10	22,0	224
20000	23,3	2,74	6,8	69	2,04	15,2	155	2,01	20,1	205
19000	22,1	2,61	6,2	63	1,94	13,9	141	1,92	18,3	187
18000	20,9	2,48	5,6	57	1,85	12,5	128	1,82	16,6	170
17000	19,8	2,36	5,0	51	1,76	11,3	115	1,73	15,0	153
16000	18,6	2,23	4,5	46	1,66	10,1	103	1,64	13,5	138
15000	17,4	2,11	4,0	41	1,57	8,9	91	1,54	12,0	123
14000	16,3	1,98	3,5	36	1,47	7,9	80	1,45	10,6	108
13000	15,1	1,85	3,0	31	1,38	6,9	70	1,36	9,3	95
12000	14,0	1,72	2,6	27	1,28	5,9	60	1,26	8,1	82
11000	12,8	1,59	2,2	22	1,18	5,0	51	1,17	6,9	70
10750	12,5	1,56	2,1	21	1,16	4,8	49	1,14	6,6	67